SCIENCE.—SUPPLEMENT.

FRIDAY, JANUARY 22, 1886.

THE COLLAPSE OF THE THEOSOPHISTS.

THE greater part of the last number of the Proceedings of the Society for psychical research[1] is taken up with the report of the committee appointed to investigate the famous Theosophical society.

For the information of those of our readers who have not followed the history of this society, a brief explanation will be necessary. The Theosophical society was formed in New York in 1875, by Colonel Olcott and Madame Blavatsky, for, it was asserted, philanthropic and literary purposes. Three years afterwards its seat of operations was removed to India, and among the better class of natives it seems to have gained not a few followers.

The evidence adduced before this committee of investigation — which included Prof. Henry Sidgwick and Messrs. F. W. H. Myers and Edmund Gurney — claims the existence in Thibet of a brotherhood whose members have acquired a power over nature which enables them to perform wonders beyond the reach of ordinary men. Madame Blavatsky asserts herself a *chela*, or disciple of this brotherhood, the members of which are spoken of as mahatmas, who are said to have taken a great interest in the Theosophical society, and to have performed many marvels in connection with it. They are said to be able to cause apparitions of themselves in places where their bodies are not, to communicate intelligently with those whom they thus visit, and to perceive what is going on where their phantasm appears. This phantasmal appearance the theosophists denominate the 'astral form.' The theosophists also brought forward evidence in support of another class of phenomena, including the transportation, even through solid matter, of ponderable objects, including letters, and of what the theosophists regard as their duplication, together with what is called 'precipitation' of handwriting and drawings on previously blank paper.

Because of the peculiar nature of the evidence, and the great improbability of the production of the alleged phenomena, it was decided to send a trusted observer to India, who should make a thorough examination of the persons involved, and of places in which these remarkable occurrences took place. Therefore, a member of the committee, Mr. R. Hodgson, B.A., of St. John's college, Cambridge, proceeded to India in December, 1884, and carried on his investigations for three months.

On hearing Mr. Hodgson's report, which is appended to the report of the committee, and carefully weighing all the evidence before them, the committee unanimously reports: —

"1. She [Madame Blavatsky] has been engaged in a long-continued combination with other persons to produce by ordinary means a series of apparent marvels for the support of the theosophic movement.

"2. That, in particular, the shrine at Adyar, through which letters purporting to come from mahatmas were received, was elaborately arranged with a view to the secret insertion of letters and other objects through a sliding panel at the back, and regularly used for the purpose by Madame Blavatsky or her agents.

"3. That there is consequently a very strong general presumption that all the marvellous narratives put forward as evidence of the existence and occult power of the mahatmas are to be explained as due either (*a*) to deliberate deception carried out by or at the instigation of Madame Blavatsky, or (*b*) to spontaneous illusion, or hallucination, or unconscious misrepresentation or invention on the part of the witnesses."

And, as the committee regards it as a waste of time to further prolong the investigation, many sober-minded readers will regard it as a foolish waste, that so much time has been already spent in the matter. But it must be recollected that this society was gaining ground and support, and was imposing on thousands of impressionable and credulous people. To them it is a real act of benevolence that this bubble has been pricked once and for all, and in a scientific way. As to Madame Blavatsky, a mere reading of the pages of evidence compels an agreement with the committee, who say, in conclusion, "We regard her neither as the mouthpiece of hidden seers nor as a mere vulgar adventuress: we think she has achieved a title to permanent remembrance as one of the most accomplished, ingenious, and interesting impostors in history."

In addition to the report of this committee, of which the preceding is a summary, this volume of

[1] *Proceedings of the Society for psychical research*, part IX., December, 1885. London, *Trübner*, 1885. 8°.

the Proceedings contains an interesting essay on 'Some higher aspects of mesmerism,' by Messrs. F. W. H. Myers and Edmund Gurney, who treat of the existence, limits, and varieties of mesmerism as a therapeutical agency; and a further report on 'Thought-transferrence,' with numerous statistics and diagrams, by Malcolm Guthrie, J.P. While many of Mr. Guthrie's experiments are novel, and as a rule more difficult than usual, yet they are of the same general character as those with which those who have followed the progress of the societies for psychical research, both in England and in this country, are already familiar.

Nicholas Murray Butler.

GIANTS AND DWARFS.

The above title is prefixed to a series of articles[1] recently published, but is, however, somewhat misleading. What is attempted is, not the consideration of the causes and consequences of abnormal deviations in height in the human species, but a presentation of the differences resulting from the absolute size of an animal, — a sort of 'animal mechanics,' which, in the author's opinion, is to become an important chapter of morphological science. The speculations presented are not without some value and considerable ingenuity: but they are characterized by a passion for reducing every thing to mechanical terms in a way which does not fit biological facts; by a peculiar anthropomorphic point of view, which gauges the actions of animals as though the animals were men; and by an avoidance of evolutionary principles, which one would think would be especially important in this connection. Perhaps it will not be altogether without interest to sketch very briefly the author's methods and his conclusions.

If a body is ten times smaller in one dimension, say in height, than another, and is to retain the same shape as the first, all linear dimensions will be reduced to 1-10, all surface dimensions to 1-100, and all solid dimensions to 1-1000, of their size in the original body. For brevity's sake, we will call an animal of average size a meso-animal (*Me*); an animal 1-10 as large will be a micro-animal (*Mi*); one 10 times as large, a macro-animal (*Ma*). Keeping these statements in mind, we will review the differences which would be caused in the several vital systems by a reduction of an animal to 1-10 its size.

Beginning with the skeleton. We will measure the strength of a bone by the multiple of the weight of the animal necessary to crush it. Now, as the strength of a beam (the bone) varies (1) as the square of the thickness, (2) directly as the breadth, (3) inversely with the length, if the bone is reduced 1-10 in length, breadth, and thickness, it can carry 1-100 of its former weight, while it has been reduced 1-1000 in volume; i.e., it is relatively 10 times stronger than the large bone. If the tooth of a meso-dog can just bear the dog's weight, then the tooth of a micro-dog can carry 10 micro-dogs; or, if it is to carry its own weight, it can become 1-5 smaller in cross-section. The smaller an animal, the more tender, weak, and soft may its skeleton be to satisfy its needs. This principle accounts for the presence of teeth in micro-animals of such a shape as would be useless in meso-animals.

Next the muscles. If 1,000 micro-animals were to jump against one meso-animal, each *Mi* would jump as high as the *Me;* for relatively equal muscles, with a single contraction, do relatively equal work. But altogether they will do absolutely as much work as the *Me.* The jump will depend on the ratio of the muscular system available for jumping-purposes to the whole body. A thousand small muscles will lift 10 times as much as one muscle 1,000 times its weight. Moreover, the small muscles would contract quicker than the large one. If one meso-man can throw stones the size of his fist for a distance of 50 of his own steps in 1 second, then a micro-man could throw stones the size of his fist for a distance of 500 of his own steps in 1-10 of a second. A micro-girl would knit a stocking of an equal number of meshes in 1-10 the time required by a meso-girl.

Again, take walking. The vibration of the leg of the micro-man will take about $\frac{1}{3}\left(\frac{1}{\sqrt{10}}\right)$ of the vibration-time of the leg of the meso-man. The small man will walk very rapidly; but, as fatigue depends on the number of contractions, he will tire easily, will be out of breath soon, and will have covered very little distance. If we reduced our man by 1-100, the walking would be so rapid as to give forth a low tone; and if to 1-1000, the vibration of his legs would give a shrill note. Hand-shaking would take the form of a gentle chirp. The micro-man is evidently at a great disadvantage in walking: this can only be remedied by giving him different locomotive organs and a different mode of locomotion. If we give him very long extra legs on each side, and put his body between them, he will be able to overcome the inertia of his body much more readily; he will be able to resist small shocks without shifting to a great extent the centre of gravity; and he will acquire a hopping gait, which is much better suited to small animals. In short, he will approximate the arthropod, in

[1] K. Fuchs, *Kosmos*, 1885, ii., Nos. 3, 4, 5.

particular the insect type. This proposition that the arthropod form is best adapted for small animals, and the mammalian form for large ones, is one of the points insisted upon throughout.

Amongst other differences are the following: The nervous impulses would be conducted to the centre in 1-10 the time, and his reflex movements and reactions would be quicker. A water-rat can see the blaze of a gun and dip under the water before the shot has time to reach it. With regard to warmth, it is shown that the body surface of a small animal gives off more heat proportionately than that of a large one: hence small birds have a thick covering, or, again, the small animals become cold-blooded.

But we will leave this part of the subject to consider what may be called a micro-psychology. Some rather curious conclusions are drawn with regard to the sense of sight. While the same amount of light will affect the retina of the meso- and the micro-man, nevertheless, owing to the difference in convergence of the two eyes (upon which depends the inference of distance), the micro-man will judge things to be smaller and nearer than the meso-man. His horizon would be much more limited, and in seeking an object he would be less apt to find it.

As to hearing. As micro-animals live in a condition where a constant noise is present, they acquire special organs for making loud noises, such as are found on the legs of some insects; while, of course, their hearing is less available to them than in the case of larger animals.

The general principle with regard to the nervous system is this: as the amount of nervous matter necessary to the needs of a small animal is proportionately much smaller than in a larger animal, such nervous matter becomes available for other purposes, and thus very fine sensibility to small physical variations, and the development of peculiar sense-organs, become possible. Eyes and ears are multiplied, touch-organs of various kinds become numerous, and there is more room for variability than in higher animals.

This theory makes it probable that small animals are endowed with a sensibility for fine discriminations of temperature, barometric pressure, moisture, and so forth, which is unknown to us; and thus we account for the observation that animals take cognizance of the approach of a storm before man does.

With regard to psychic life, the following statements will be of importance: the micro-animal procures its food for a given period with less trouble than a meso-animal, it builds its house in a much shorter time, it foresees natural changes much better, and its movements are quicker. The result will be far-reaching forethought by means of house-building and harvesting instincts. Any act desirable for the moment, the meso-animal will be apt to neglect on account of the bother of doing it. A man sees a spot on his writing-desk for years, and never cleans it up; he decides to learn by heart a table of constants which has to be looked up with trouble each time, but never does it. This dread of labor causes most kinds of neglect. But with the micro-animal the act follows the word; there is no trouble, and thus much annoyance and danger to health are avoided. In the case of approaching danger, say of a storm, a meso- and a micro-animal will act very differently. The meso-animal recognizes the danger only when it is near, is flurried and frightened, has no time to build a shelter, and must seek a chance one. The micro-animal knows that the danger is not very near, that he has ample time to build a shelter, and need not trust to chance. And thus we see why many of the smaller animals prefer to build a new nest, to protecting or finding an old one, it is so readily done. By arguments which it would be difficult to reproduce, the conclusion is reached that the train of thought of this micro-animal is related to that of the meso-animal somewhat as a minuet to an opera of Wagner's, or a frieze pattern to a painting by Kaulbach; also that his conceptions would tend to be mathematical and regular. But in general it may be said that in psychic life the meso-man would have the advantage of the micro-man.

This very partial account of these speculations will, perhaps, serve to show their general tendency. They certainly belong to a class of thinking which is rather foreign to recent thought, but bring with them a suggestiveness which makes the problem discussed a very interesting one. The most serious objection is that very little attempt is made to show that the theory fits the facts (which might easily have been done), and more attention is paid to select facts that seem to fit the theory. As particularly worthy of consideration, may be noted the argument that when proportionately less of a certain tissue is needed for actual sustenance of the animal, more of it becomes disposable, and is subject to variation. It would seem possible that some valuable facts might be attained by a careful experimental study of the problems suggested by these theoretical considerations; and while they will not be sufficient, as they have been to our author, to rear upon them a whole physiology, a whole zoölogy, and a whole psychology, they will do a unique service to science.

THE RACES OF BRITAIN.

It is the praiseworthy custom of the Welsh national Eisteddfod to offer prizes for essays upon some topic relating to the ancient national life. This has produced excellent results in many directions, especially in the encouragement thus bestowed upon ethnological studies. Among the substantial fruits of such competitions are to be reckoned an able study by Mr. Luke Owen Pike on 'The English and their origin,' and Dr. Thomas Nicholas's valuable treatise upon 'The pedigree of the English people,' which in 1878 had reached its fifth edition. To neither of these learned works, however, was the great prize awarded. It was bestowed upon an essay presented by Dr. Beddoe, the late president of the Anthropological society of London, which has just been published, in an expanded form, in the volume now before us.

Differing from previous works, like those just alluded to, and Professor Rhys's 'Celtic Britain,' which are principally based upon historical and linguistic investigations, this is made up, to a large extent, of tables, maps, and plates compiled from the author's personal observations on color and stature, conducted on a large scale.

Dr. Beddoe's system is founded essentially upon the belief that permanence of color of the hair and eyes is most indicative of racial differences. The opposite opinion seems to have prevailed, ever since the days of Galen and of Celsus down to quite a recent date, that the color of the hair depends simply upon temperature and latitude. Our author's method separates eyes into three sorts, — light, intermediate or neutral, and dark. This distinction is founded as much upon shade as color. They are further subdivided into five classes, in accordance with the color of the associated hair; viz., red, fair, brown, dark, and black. Thus is derived, as a ready means of comparing the colors of two peoples or localities, the 'index of nigrescence,' by "taking 100 of each, and subtracting the number of the red- and the fair-haired persons from that of the dark-haired, together with twice the black-haired." This gives a number which compendiously represents this tendency. The black is doubled in order "to give its proper value to the greater tendency to melanosity shown thereby; while brown (chestnut) is regarded as neutral." This method Dr. Beddoe believes to be preferable to that of Virchow, which notes only the percentages of the pure blond type (blue eyes and fair hair) and of the pure brunette type (brown eyes and dark hair), and pays but little attention to other combinations, which are regarded as results of crossing.

As a striking example of the great value of the color of the hair as a test of race, he instances one of the most distinct anthropological frontiers of Europe,— a real ethnic division along the line that separates the Flemish tongue, which represents a German stock, on the north, and the Walloon, descending from an ancient Belgic race, on the south. The difference in the physiognomy of the two peoples is very marked; but such tests as head-measurements and stature fail, while that of the color of the hair everywhere holds good. So, too, as proving that the color of the hair does not depend upon latitude and temperature, he brings forward the example of the occurrence among the dark-haired Italian race of two centres of comparative fairness, — one in the north-western part of the valley of the Po, the other in the region lying between Terracina and Naples.

But Dr. Beddoe had by no means confined his attention to observations upon the hair and the eyes. In the absence of "sufficient osseous material in the museums for determining the form and size of the skull," he has measured a considerable number of living British heads. He gives an amusing account of the way in which he obtained a series of head-measurements in Kerry, without running the risk of fatiguing or irritating the subjects. The people there have large heads, but are of low intelligence, with a great deal of cunning and suspicion. The travelling party consisted of four, and, "whenever a likely little squad of natives was encountered, the two archeologists got up a dispute about the relative size and shape of their own heads, which I was called in to settle with the calipers. The unsuspecting Irishmen usually entered keenly into the debate, and, before the little drama had been finished, were equally betting on the sizes of their own heads, and begging to have their wagers determined in the same manner."

So far as concerns the survival of the prehistoric races in Great Britain, Dr. Beddoe accepts the probability of Boyd Dawkins's theory that the paleolithic people were the ancestors, or at least the near relations, of certain still existing Mongoloid races, particularly of the Eskimo. In this opinion, however, he is opposed by the eminent Hunterian lecturer, Professor Flower, who, in his president's address, delivered last January before the Anthropological institute of Great Britain, argued that the Eskimo are probably of comparatively late origin, on the ground of their being such an intensely specialized race. But our author thinks he has sufficient ground for assuming the existence of traces of some Mongoloid race in the modern population of Wales and the west of England. He in-

The races of Britain: a contribution to the anthropology of western Europe. By John Beddoe, M.D., F.R.S. Bristol, *Arrowsmith*; London, *Trübner*, 1885. 8°.

stances in particular the examples he has noted of the oblique or Chinese eye, and of prognathism, or prominence of the jaws. The latter peculiarity, by itself, would not be of much value if it were not for the great similarity in other respects that exists among the individuals in whom it is manifested. But prognathism by no means implies a low type of humanity, and it is remarked by our author that eloquence, or at least readiness of speech, seems to be a general characteristic of it.

For the neolithic period, while accepting in a broad way Thurnam's formula, 'Long barrows, long heads; round barrows, round heads,' Dr. Beddoe cannot allow that this represents accurately the character of the entire population. He believes that the distinctive practice of dolmen-building was established in Britain by a pure long-headed race, while the broad-headed people were the introducers of bronze. "Whencesoever they came, the men of the British bronze race were richly endowed physically. They were, as a rule, tall and stalwart; their brains were large, and their features, if somewhat harsh and coarse, must have been manly and commanding." It has been objected to this type, that the great development of the brows, and the transverse furrow on the forehead above, are shared by the Australian and other savage races. But it is well established that such points of likeness as these to the anthropoid apes are distributed variously among the different races of mankind, and that no one of them, taken by itself, implies intellectual or moral inferiority. "Certainly," says Dr. Beddoe, "the British bronze type is found frequently — I should say with disproportionate frequency — among our best as well as our ablest and strongest men."

But at the bronze period the mass of the population cannot be regarded as belonging to this type. Their skulls present a shape intermediate between those of the long barrows, and those of the round barrows, — a form for which Wilson has proposed the name of 'pear-shaped,' and our author the one, not very satisfactory to himself, of 'coffin-shaped.' This type may be the result of a partial fusion of the two races, or it may have been imported, already made, by the very numerous invaders from Belgic Gaul. It has usually been styled the Keltic type, but Broca thinks that the name of Kelt ought to be restricted to the race that predominated in old Keltic Gaul, from Bretagne to Savoy. Their short, thick-set figures, and large, broad heads, are very different from the ancient British type, whose general distribution throughout the three kingdoms tells strongly against its being a late importation.

Such was the population of Britain at the time of the Roman conquest, composed of several strata, unequally distributed, of a Keltic-speaking race, some Bryothonic, others Gaelic, in dialect. This ancient British race belonged to the tall, blond stock of northern Europe, rather than to Broca's Keltic race; and they probably greatly resembled in appearance the provincials carved upon the sarcophagus of the Roman prefect Jovinus, — now preserved in the Museum of the Hôtel de Ville, at Reims, — who are conspicuously different in features from the modern Germans. This race was superposed upon a foundation principally made up of the dolichocephalic dark race of southern Europe, the so-called Iberian, which is still strongly represented in the north of Scotland and in Ireland; but no Germans, to be recognized as such by speech as well as person, had probably as yet entered Britain.

The Roman conquest, however, had no material effect in changing the character of the population. Far different was it with the Anglo-Saxon invasions that followed upon its abandonment by the Romans. The most important chapter in the volume is naturally devoted to a careful review of the various theories as to the origin of the different invading tribes, and to a thorough study of the evidence of all kinds that might tend to shed light upon the process of 'the making of England,' — ethnological and linguistic, as well as that derived from laws and social institutions. We have space to touch, and that only in the briefest manner, upon one or two of the points discussed.

Our author's researches are quite in accord with the conclusions reached by Senator Hoar in a paper read last spring before the American antiquarian society, in regard to the origin of the Yankee of caricature, the typical Uncle Sam, and Brother Jonathan, "with his long, loosely-set limbs, his sharp nose and chin, his high cheek-bones, his narrow shoulders and high head." Dr. Beddoe paints this Yankee portrait to the life, when he is describing the true Frisian type, to be seen in the people dwelling around the Zuyder Zee, who are very different in their appearance from their neighbors the Hollanders. He proves that differences existed, physical as well as dialectic, between the ancient Frisians and the Saxons; and he shows that the county of Kent was the first to be invaded by the Frisians and their neighbors the Jutes. So the main object of Senator Hoar's paper is to show the obligations of New England to Kent for much of its laws and social institutions, and the strong physical resemblance of the people of the two regions. Dr. Beddoe also brings out the notable likeness between the people of Boston, in Lincolnshire, and the frequenters of the Antwerp market. In no considerable town in England is the index of nigrescence so low. In one

particular, however, Dr. Beddoe differs from Senator Hoar; that is, in respect to the origin of the custom of gavelkind, by which the land of the father descends to all his sons in equal portions, — a custom adopted by our ancestors from the usage of Kent, and which has had a most important effect upon our history in fostering democratic institutions. Our author believes that this institution was derived from the Kymric branch of the ancient Britons, and not the Germans, and that the term can be best explained by the Welsh language.

Great differences of opinion prevail among recent writers as to the consequences of the Anglo-Saxon conquest of England, hinging mainly upon the degree of credibility attached by them to the statements of the old British chronicler, Gildas. Some hold with Freeman and Green that the ancient race was mostly exterminated; while Nicholas, and the Keltic school in general, are equally convinced that the British element predominates in the modern English people. Our author's conclusions upon this interesting subject may be summed up as follows: About the middle of the fifth century certain German tribes, invading the country, settled some districts almost exclusively, making serfs of some portion of the prior population, and forcing the remainder to the west and the south. They uprooted Christianity, and changed to a great degree the local nomenclature. But they adopted, or allowed to remain, many usages relating to the land, and they intermarried largely with the native women; so that their descendants exhibit changes in physical type which approximate them somewhat to the original inhabitants. In language the most important and necessary words, particularly among the verbs, are Teutonic; so are most of the grammatical forms and rules; and so, also, is the pronunciation.

The Danes, in the latter part of the ninth century, by their invasions, gave a strong Scandinavian tinge to the eastern counties of England, and made themselves exclusive masters of the islands around Scotland: in other parts of the country their influence is not marked.

But the Norman conquest, although it did not at once introduce any very large accession to the population, undoubtedly produced the type that is still the prevailing one among the upper classes of England. Our author finds, by an examination of the color-tints of portraits of the nobility, a prevalence of dark hues, even more marked in the sixteenth and seventeenth centuries than in the nineteenth. The severity of the conquest was chiefly felt in Yorkshire and parts of Lancashire, where the Anglo-Danish population was nearly destroyed. In other parts of the country no permanent change in the physical type or racial elements seems to have resulted from it. In this branch of his inquiries, Dr. Beddoe has drawn, principally from Domesday book and other mediæval records, interesting and useful inferences, which we regret not to be able to quote.

We will conclude by calling especial attention to three exceedingly well executed plates, in which are represented living faces, which, in the judgment of our author, reproduce the various types of 'the races of Britain.' His remark about 'the singular beauty of the women of Devonshire' seems fully warranted. H. W. H.

THE CAUSATION OF PULMONARY CONSUMPTION.

Scarcely four years have elapsed since the important discovery of the tubercle-bacillus by Koch was announced. Many then thought that the key to the various problems of pulmonary consumption was close at hand, if not in our actual possession. Certainly therefrom a new impetus has been received in the study of these problems, — an impetus that may eventually bring about their solution; but so far this discovery has added but little to our actual knowledge of the causation of this most insidious disease.

This bacillus is readily and definitely distinguished from other allied micro-organisms. It seems to be present in tubercles wherever found, and is usually apparent in the sputum of consumptives; in some few cases it is believed to have been detected in the sputum when no signs of the disease were discovered; and other cases are known where the most careful examinations have failed to detect them, though tubercles were unquestionably present. Still the evidence so far is only negative. We may, without doing violence to the facts, assume that the bacillus Kochi is a constant accompaniment of tuberculous disease. They are remarkable for their vitality: decomposed or even dried sputum containing them retains all the powers of the fresh microbe, even after months have elapsed. Inoculated into the tissue of animals, either in the fresh state or after cultivation, they almost invariably produce tuberculous disease, though never the ordinary chronic consumption, but quick consumption, or miliary tuberculosis, which is held to be distinct in its nature. From these facts the conclusion would seem self-evident that floating particles of dried sputa, or at least when freshly thrown off from the diseased subject, might easily enter the lungs of healthy persons, and reproduce the disease. Unfortunately clinical evidence does not support this *a priori* deduction. Recent observations demonstrate that food impregnated with tubercu-

lous matter will produce corresponding disease in the intestine and other abdominal viscera. A number of dogs, subjected for several weeks to an atmosphere surcharged with particles of sputa, became tuberculous, but the evidence is not convincing.

The possibility of tubercular inoculation has been known for years. To Koch is due the credit of discovering wherein the peculiar agency consisted.

The contagiousness of pulmonary consumption has been believed for more than a century, and still is accepted by many physicians. Dr. Hermann Brehmer, upon whose extensive work [1] the present article is based, warmly contests these views, and, it must be admitted, with ability. He, in brief, endeavors to prove that pulmonary chronic consumption is never produced by the bacilli, and is neither contagious, nor, strictly speaking, hereditary. As the director for more than thirty years, of a private institution for the treatment of consumptives, he has been able to study nearly twelve thousand cases, chiefly drawn from the better classes. Certainly conclusions based upon such ample clinical material are entitled to our consideration.

Though some adherents of the bacilli theory of contagion have believed that these organisms are directly hereditary, lying latent for a longer or shorter period, to finally take on activity, yet such a view seems wholly improbable, if not absurd. Thus it is apparent, in what is considered hereditary consumption, that that which is entailed upon the offspring of consumptive parents is not the disease itself, but merely the disposition to the disease, — the consumptive habitus. If such a predisposition exist, as it unquestionably does, wherein does the true causation lie? Not in the bacilli, for they merely find a soil already prepared for their reception, and isolation does not appear to affect the chances of such predisposed persons becoming diseased. A sound, healthy person never becomes infected by the bacilli, at least never in the form of chronic pulmonary consumption, and the possibility in any other is not yet proven. It is only those in whom a predisposition exists — a consumptive habitus — who acquire the disease. What, then, is the true causation of the ordinary phthisis? This the author endeavors to show.

He has shown from the researches of Rokitansky, and his own, that the lungs of consumptives are abnormally large, and the heart and abdominal viscera are abnormally small. Thus the lungs do not receive their due amount of nourishment, and become the foci of disease, where the bacilli readily and easily find a lodging-place. This view may appear startling, yet it seems well sustained. The flat-breasted person of consumptive tendency has the lungs, not small, as is generally supposed, but elongated and large; the heart not merely atrophied, but actually lessened in capacity and power. Thus the relation between the normal heart and lung is about one to six; but in many consumptives so great a discrepancy as one to twelve may exist. The relation between the lungs and heart may consist not only in the former being too large, or the latter too small, but both may be actually normal so far as size is concerned, and the evil be found in abnormally small pulmonary arteries. Not only does the heart show physical incapacity, but it is functionally weakened, palpitation always existing to a greater or less degree in consumptives. Whatever may be the exact relation between these organs, the result is invariably the same, — deficient nutrition to the tissue of the lungs. Rarely are the abdominal viscera enlarged, and almost constantly it is found that consumptives have never been hearty eaters. A person with large breast, and its accompanying small lungs, an enlarged and powerful heart, well-developed abdominal viscera, and a hearty appetite, rarely, if ever, becomes consumptive.

Here, then, is the ultimate cause of the disease, — impaired nutrition. This impaired nutrition may be the resultant of various antecedent causes. First, and most important of all, is that due to heredity or prenatal life. Instances are too numerous to require argument, that acquired peculiarities may be and are transmitted to offspring. Impaired vitality, from whatever cause it may be due, re-appears often in the child. When such impaired vitality consists in the predisposing abnormal correlation of lungs, heart, and viscera, the fuel is prepared that only needs the match to start into active flame. The question here is of the greatest moment, — Were the tubercle-bacillus no longer in existence, would tuberculous disease become extinct?

A predisposing cause of but little less importance is that of the exhausted vitality in the mother, due to too frequently repeated gestation, — a cause that not only affects children of later births, but retro-acts strongly upon the mother. Thus it is that the later descendants of large and numerous families are more disposed to consumption. Again: lack of nutrition in childhood, whereby the healthy and normal development of the alimentary and arterial systems is retarded, produces a like disposition.

Injuries to the lung, in some instances, have

[1] *Die aetiologie der chronischen lungenschwindsucht, vom standpunkt der klinischen erfahrung.* Von HERMANN BREHMER, sen. Berlin, *Hirschwald*, 1885. 8°.

been thought to be an exciting cause; but such cases are due, the author believes, to the partial stagnation of the blood in the lung. In such rare cases where the disease first appears in the right lung, the author believes it to be owing to some malformation or aneurism, whereby this lung receives a less quantity of blood than the left.

Dr. Brehmer gives a history of five hundred cases in full, — cases in the offspring of non-consumptive ancestry, of those suffering under scrofulous or allied evils, and cases due to heredity. Other interesting results are perceived from the study of these cases. An unquestionable interrelationship appears between consumption, mental derangement, epilepsy, and deaf-mutism. The researches of Professor Bell upon deaf-mutism have, the present writer believes, substantiated the relationship of this last defect with other defects, and also show its heredity. May not all these proceed from the same general cause, — the transmission from parent to child of abnormal or deficient organs, which are ultimately due to impaired nutrition or unfavorable environment? That such effects do not follow deprivation alone, is apparent. Too great culture or luxurious habits certainly seem to be exciting causes. How much they are owing to nervous influence is a problem of interest. It is a well-established fact that wild animals kept in confinement are especially liable to phthisis. The most highly bred strains of domestic stock are likewise prone to tuberculous disease.

That consumption is contagious in the ordinary sense of the word, the author emphatically denies. It is true that the bacilli are rarely found in the atmosphere, except in large hospitals, where many cases of the disease are treated; but the author contends that a person not predisposed may expose himself with the utmost impunity to the contagia without becoming infected. As an evidence, is adduced the fact that in Göbersberg, during the last forty years, many thousand cases have been treated; nevertheless, the mortality from this cause among the inhabitants of the place has actually decreased by about fifty per cent from that of the preceding forty years. A century ago, in Naples and in Portugal, legal enactments placed this disease under the most rigorous ban. It was looked upon and treated as one of the worst pestilential diseases, and every thing connected with it pronounced unclean and dangerous. For fifty-six years were these rigorous laws enforced, to the great discomfort of the people, but without result: there was no decrease in consumption. He disclaims the prevalent opinion that married people will contract the disease from one another. Indeed, according to his experience, it is very rarely indeed that both husband and wife die of consumption. It is worthy of note, however, that whenever facts seem to warrant the assumption of contagion between husband and wife, it is usually the wife who suffers.

The author believes that the operation of all these causes is such that morphological changes are brought about, enabling one years, even decades, in advance, to predict with great probability which members of a given family will be afflicted with pulmonary consumption, and which will remain healthy. When acquired peculiarities through generations have become fixed, then, and in this sense only, does pulmonary consumption become hereditary.

Should these views of the causation of consumption be sustained, the question of contagion, or rather non-contagion, in another decade will no longer be disputed, and then the possibility of the conveyance of phthisis from man to man, in any other way than by direct inoculation, will be looked upon only as a superstition. When such definite conclusions have been reached, we will at last be in a position to study rationally the all-important problem of prevention and treatment.

N. W.

An important investigation into the chemical constitution of the venom of the Indian cobra (Naja tripudians) formed, says the *Lancet*, the subject of a paper read before the Royal society, on Dec. 16, by Dr. R. Norris Wolfenden. It has been alleged that the venom of this snake contains an alkaloid and a principle known as 'cobric acid.' Dr. Wolfenden has been unable to verify either of these assertions; indeed, he denies the existence of both substances. He further shows that the venom loses its power when the albuminous bodies are removed or otherwise rendered inert. Mixtures containing the cobra poison, when treated with metallic salts that precipitate albumen, were found harmless. Wolfenden, like Weir Mitchell and Reichert, has found three poisonous proteids in the venom. The largest quantity of proteid was a globulin that had asphyxiating properties; and a smaller quantity of syntonin, possessing similar properties, was also detected. A form of serum albumen existed in minute proportions, and this was ascertained to have remarkable powers, paralyzing small animals. It has been objected that the possession of poisonous qualities by a serum albumen is a unique fact, but Schmidt-Mulheim and Albertoni have found ordinary peptones to be toxic when injected into the blood, causing various nervous disturbances, lowering the blood-pressure, and preventing the coagulation of the blood.